

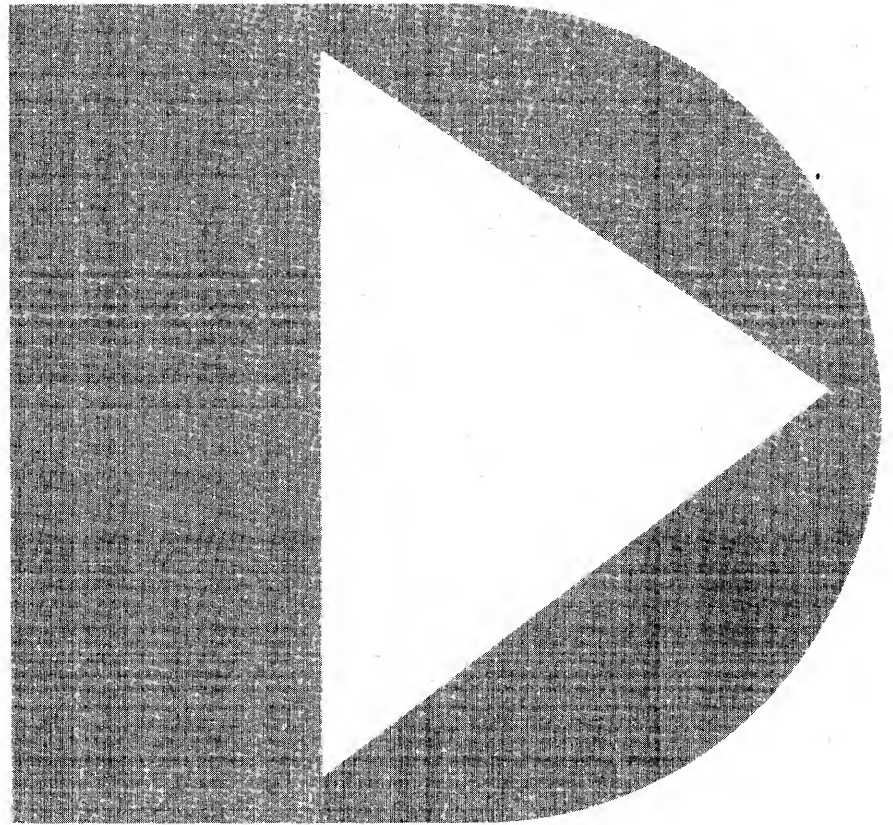
DISK CONTROLLER/DRIVE (CONSOLE MOUNTED) 2200-350

DISK CONTROLLER/DRIVE (FREE STANDING) 2200-351

MARCH 1, 1972

# Product Specification

# Datapoint



DATAPOINT CORPORATION

PRODUCT SPECIFICATION

DISK CONTROLLER/DRIVE (CONSOLE MOUNTED)  
DISK CONTROLLER/DRIVE (FREE STANDING)

2200-350  
2200-351

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## 1.0 GENERAL DESCRIPTION

The Datapoint 2200-350 (and 2200-351) is a single, removable cartridge disk system. It provides the Datapoint 2200 user with non-volatile random access mass memory with an on-line capacity in excess of 2.4 million bytes. Off-line capacity is unlimited by use of the removable disk cartridge.

The 2200-350 model is a console mounted controller and drive including mounting facilities for the associated Datapoint 2200. The 2200-351 is identical except that the disk drive and controller are mounted in a free-standing cabinet.

Both models may control up to three additional disk drives by attaching 2200-354 disk drive extension units.

## 2.0 SYSTEM REQUIREMENTS

The 2200-350 and 351 will interface with the input/output bus of the Datapoint 2200 (both version 1 and 2) and can be used with any memory size. The disk controllers do not draw power from the Datapoint 2200 and do not limit the number of other devices that may be attached to the input/output bus except that the total input/output bus cable length must not exceed 25 feet.

## 3.0 TECHNICAL DESCRIPTION

### 3.1 Disk Drive

#### 3.1.1 Operating Characteristics

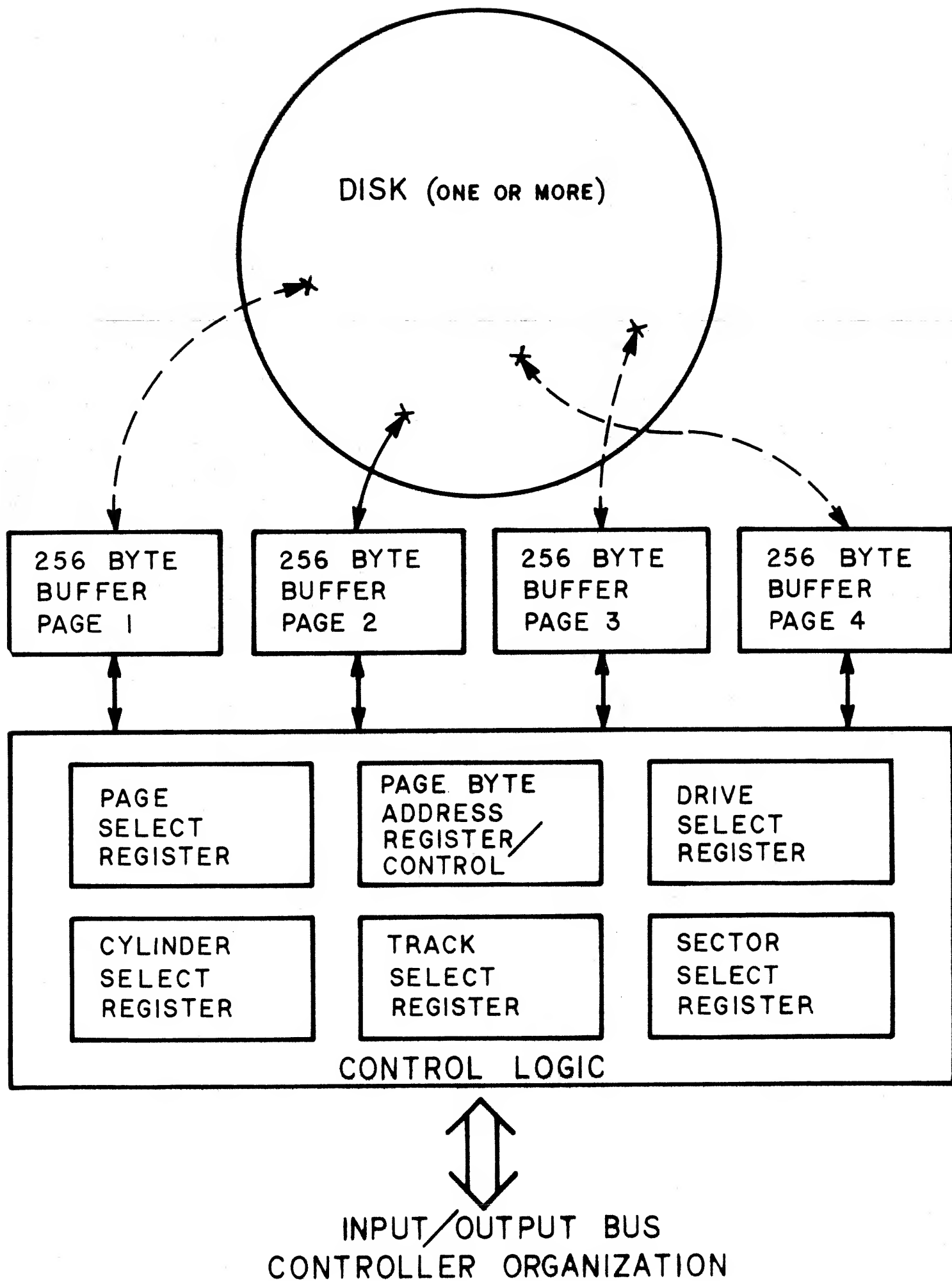
Each disk drive has a single removable disk cartridge recorded on both surfaces with double frequency recording. The disk cartridge has the following characteristics:

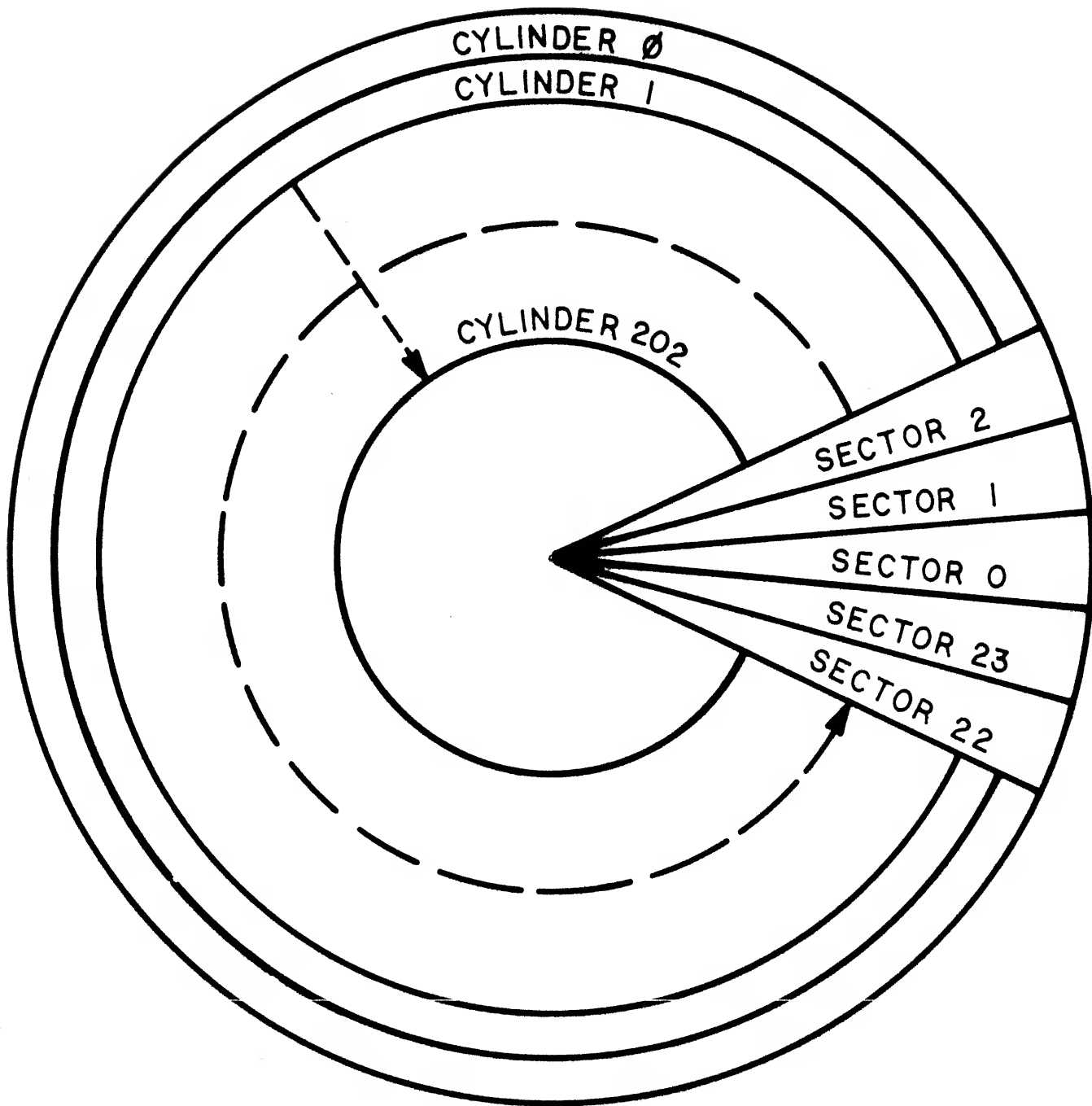
Bit Density	2200 BPI
Track Density	100 TPI
Bit Transfer Rate	1562 KHZ
(to controller buffer)	

A write protect feature is incorporated which, after cartridge insertion disables the write amplifier until it is manually enabled, via a front panel button.

#### 3.1.2 Timing

Rotation	1500 rpm
Average Latency Time	20 msec.
Head Positioning:	
Average	70 msec.
Track-to-track	15 msec. max.





TRACK  $\emptyset$  — TOP SURFACE  
TRACK 1 — BOTTOM SURFACE  
DISC ORGANIZATION

### 3.1.3 Capacity

Each disk cartridge has a capacity of 2,494,464 bytes formatted as follows:

Surfaces	2
Tracks/Surface	203
Tracks/Disk	406
Sectors/Track	24
Sectors/Disk	9,744
Bytes/Sector	256
Bytes/Disk	2,494,464

### 3.2 Controller

#### 3.2.1 General

The controller contains a 1024 byte memory which is used as a speed buffer between the 2200 and the disk. The buffer memory is divided into four pages of 256 bytes each thus allowing the storage of four independent sectors of data in the controller buffer memory. This memory can be accessed randomly by the Datapoint 2200, facilitating the updating or sorting of small amounts of data within a sector. Unless a specific address is provided the buffer memory will automatically address sequentially, within each page, for sequential data entry or retrieval. The controller performs all the necessary synchronization with the disk drive and generates the required signals including the preamble and error detection code. The error detection is accomplished through the use of a polynomial cyclic redundancy checking code (CRCC).

#### 3.2.2 Disk Commands

All communication between the disk controller and the Datapoint 2200 is via the input/output bus using the External Command instructions and the A-register. (See the Datapoint 2200 Reference Manual [Version 1 or 2]).

External commands (except for ADR, STATUS, or INPUT while in STATUS mode) may be executed only if the controller is ready (CONTROLLER READY status bit true). If one is executed while the controller is not ready, the only action taken will be the setting of the COMMAND ERROR status bit.

In all of the following descriptions, any status bits not mentioned are not affected.

### 3.2.2.1 COM1 - PERFORM Command

When the EX COM1 is performed, the A-register will contain information in the following format:

P	P	X	X	C	C	C	C
---	---	---	---	---	---	---	---

The command performs a variety of functions depending upon the CCCC bits:

00dd (0-3) - Select the drive on the daisy chain according to bits  $A_0$  and  $A_1$ . If the selected drive is on the daisy chain, supplied with power, loaded with a disk cartridge, has its LOAD/RUN switch in the RUN position, has completed its start up cycle and the write check flip flop is not set, the ON LINE status bit will come true. The start up cycle takes approximately 50 seconds from the time the LOAD/RUN switch is put in the RUN position. Operator intervention will normally be required to correct any problems that cause the ON LINE status bit to remain false.

0100 (4) - Clear the selected buffer page to all zeroes and leave the page byte address register at location zero. Only the CONTROLLER READY status bit (goes false for approximately half a millisecond) and the OVERFLOW status bit (left false) will be affected.

0101 (5) - Read the selected sector on the selected track into the selected buffer page starting at location 0 and ending at location 377 (octal) in the buffer page. The page bytes address will be left at location zero. The DISK READY and CONTROLLER READY status bits will go false for 1 to 80 milliseconds. If the read is successful, the CRC ERROR and SECTOR NOT FOUND status bits will be false and the OVERFLOW status bit will be true after the CONTROLLER READY status bit comes true. If the CRC ERROR status bit is true, then the CRC failed when the read was performed. If the SECTOR NOT FOUND status bit is true, then the last EX COM3 addressed a non-existent sector.

0110 (6) Write the selected buffer page starting with location 0 and ending with location 377 (octal) in the buffer page on the selected sector of the selected track. The page byte address will be left at location zero. The DISK READY and CONTROLLER READY status bits will go false for 1 to 80 milliseconds. If the write was successful, the SECTOR NOT FOUND status bit will be false and the OVERFLOW status bit will be true after the CONTROLLER READY status bit comes true. If the SECTOR NOT FOUND status bit is true, then the last EX COM3 addressed a non-existent sector.

0111 (7)- Perform activities the same as (6) except that after the data is written, go back and read it while only generating the CRC (does not read the data back into the buffer page) to check if the write was successful. The CRC ERROR status bit will reflect the result of this check read, being true if an error occurs. After executing this command, the DISK READY and CONTROLLER READY status bits will be false for 40

to 120 milliseconds. Note that the data within the buffer page will not be changed by this command so one need only execute another write command if the CRC failed on this one.

1000 (8) - Issue a RESTORE command to the selected disk drive. This will cause it to home to track zero (takes several seconds) during which time the DISK READY status bit will be false. The CONTROLLER READY status bit will be false for approximately 50 microseconds after issuing the command. Also, the COMMAND ERROR status bit will be false after the CONTROLLER READY status bit comes true.

1001 (9) - Select the buffer page specified by the PP bits. This has no affect on the page byte address register. None of the status bits will be affected.

#### 3.2.2.2 COM2 - SEEK CYLINDER

When the EX COM2 is performed, the A-register will contain a cylinder number to which the head will be positioned if the number is between 0 and 312 (octal). If the number is between 313 and 377 (octal) then no head movement will occur, the COMMAND ERROR status bit will be set, and the DISK READY status bit will not be affected. Otherwise, only the DISK READY status bit will be affected, going false for 15 to 130 milliseconds. (The CONTROLLER READY status bit will be false for up to 50 microseconds after command execution.) Note if because of some malfunction within the disk drive, a seek incomplete occurs, the COMMAND ERROR and DISK READY status bits will both come true. A RESTORE command (EX COM1 with 010 octal in the A-register) must subsequently be executed to clear this condition (will cause the COMMAND ERROR status bit to go false).

When the EX COM3 is performed, the A-register will contain information in the following format:

X	X	T	N	N	N	N	N
---	---	---	---	---	---	---	---

Bits XX are unused. Execution of this command will cause sector NNNN and track T to be used when the next read or write is performed. Note that NNNNN is meaningful only for values between 0 and 27 (octal) and that issuing values between 30 and 37 (octal) will cause a SECTOR NOT FOUND when the next read or write operation is performed. This command affects none of the status bits.

#### 3.2.2.4 COM4 SET PAGE BYTE ADDRESS

When the EX COM4 is performed, the A-register will contain an address within the buffer page. Any eight bit value is meaningful since the buffer page contains 256 bytes. None of the status bits will be affected by this operation.

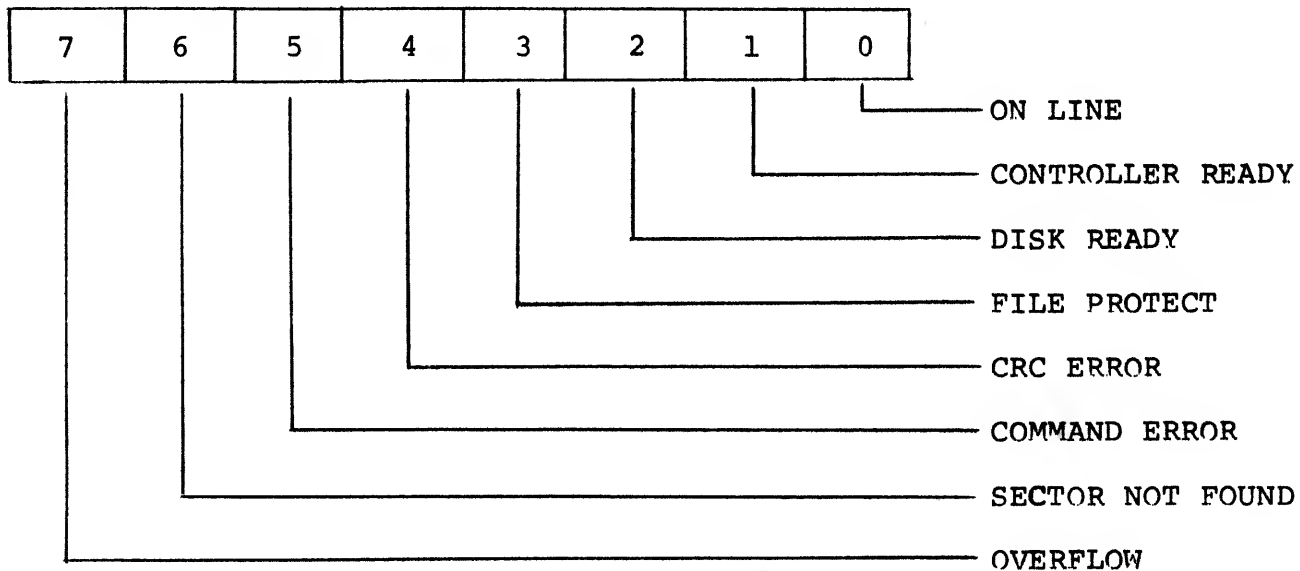


### 3.2.2.5 ADR - ADDRESS DEVICE

When the EX ADR command is performed, the A-register will contain the address of the desired disk controller in the input-output system (address 170 octal is the standard address of the disk controller). Execution of this command also puts the controller in the STATUS mode as explained below.

### 3.2.2.6 STATUS - SET STATUS MODE

Subsequent to execution of the EX STATUS or EX ADR command, but prior to the execution of the EX DATA command, the information loaded into the A-register via the INPUT command will be status bits in the following format:



All of the bits have been explained in the previous discussion except for FILE PROTECT which is simply connected to the corresponding button on the front of the selected drive. If this bit is true (the button on the front of the drive is lit), no data will be written on the disk, even though it will appear to the program that the write operations are being performed. None of the status bits are affected by the EX STATUS command.

### 3.2.2.7 DATA - SET DATA MODE

Subsequent to the execution of the EX DATA, but prior to execution of the EX STATUS or EX ADR command, all information loaded into the A-register via the INPUT command will be bytes from the buffer page location pointed to by the page byte address register. After execution of the INPUT command, this register will then be incremented one location. If the page byte address was 377 (octal) it will become 0 and the OVERFLOW status bit will be true. Otherwise, the OVERFLOW status bit will be false. Note that the CONTROLLER READY status bit is not affected by this operation so one need not check it between successive INPUT commands. None of the status bits are affected by the EX DATA command.

### 3.2.2.8 INPUT - INPUT STATUS OR DATA

This command has been explained in the above two paragraphs.

### 3.2.2.9 WRITE - OUTPUT DATA

When the EX WRITE command is performed, the contents of the A-register will be stored in the buffer page location pointed to by the page byte address register. This register will then be incremented one location. If the page byte address was 377 (octal) it will become 0 and the OVERFLOW status bit will be true. Otherwise, the OVERFLOW status bit will be false. Note that the CONTROLLER READY status bit is not affected by this operation so one need not check it between successive EX WRITE commands.

## 3.3 POWER REQUIREMENTS

The input power requirements of the 2200-350/351 exclusive of the Datapoint 2200 are as follows:

	<u>Standard</u>	<u>Optional</u>
Voltage:	115 VAC + 10%	220 VAC + 10%
Current:	8.5 amps. max.	4.2 amps. max.
Frequency:	60Hz + 1Hz	47-63Hz
Phase:	Single	Single

## 4.0 PHYSICAL DESCRIPTION

### 4.1 2200-350

The Datapoint 2200-350 is housed in the pedestal of a console unit. The top of the console is designed to accept the Datapoint 2200. The 2200-350 weighs approximately 200 pounds exclusive of the Datapoint 2200.

An outline drawing of the 2200-350 is shown in Fig. 4.1.

### 4.2 2200-351

The Datapoint 2200-351 is housed in a free-standing equipment pedestal which compliments the standard console unit. The 2200-351 weighs approximately 175 pounds. An outline drawing is shown in Fig. 4.2.

## 5.0 ENVIRONMENTAL REQUIREMENTS

The Datapoint 2200-350/351 should be operated in ambient temperature range between 55° and 80°F with a relative humidity range between 20 and 80 percent with no condensation.

## 6.0 INTERFACE REQUIREMENTS

There are no interface considerations other than the I/O cable between the Datapoint 2200 and the 2200-350/351 disk.

## 7.0 PARTS LIST

The following separate parts are part of the 2200-350/351 Disk and are included in each shipment:

- 1 2200-350/351 Reference Manual
- 1 Disk Test Program Cassette

Note: Disk cartridges must be purchased separately.